IN THE CLAIMS:

Please cancel claims 1-3 and 33-38. **Please also amend** claims 4-32 as shown in the complete list of claims that is presented below.

Claims 1-3 (cancelled).

Claim 4 (currently amended). ~~The method according to claim 2,~~ A soft decision method for demodulating a received signal $\alpha + \beta i$ of a square Quadrature Amplitude Modulation (QAM) consisting of an in-phase signal component and a quadrature phase signal component, comprising:

obtaining a plurality of conditional probability vector values, each being a soft decision value corresponding to a bit position of a hard decision, using a function including a conditional determination operation from the quadrature phase component and the in-phase component of the received signal,

wherein a conditional probability vector decision method for demodulating a first half of a total number of bits is the same as a decision method for demodulating the remaining half of the bits, and is determined by substituting a quadrature phase component value and an in-phase component value with each other, and

wherein the demodulation method of the conditional probability vector corresponding to an odd-ordered bit is the same as a calculation method of the conditional probability vector corresponding to the next even-ordered bit, where the received signal value used to calculate the conditional probability vector corresponding to the odd-ordered bit uses one of the α and β according to a given combination constellation diagram and the received signal value for the even-ordered bit uses the remaining one of α and β.

Claim 5 (currently amended). ~~The method according to claim 3~~, A soft decision method for demodulating a received signal $\alpha + \beta i$ of a square Quadrature Amplitude Modulation (QAM) consisting of an in-phase signal component and a quadrature phase signal component, comprising:

obtaining a plurality of conditional probability vector values, each being a soft decision value corresponding to a bit position of a hard decision, using a function including

a conditional determination operation from the quadrature phase component and the in-phase component of the received signal,

wherein a first conditional probability vector decision method for demodulating a first half of a total number of bits is the same as a second conditional probability vector decision method for demodulating a second half of the bits, and is determined by substituting a quadrature phase component value and an in-phase component value with each other,

wherein the demodulate signal has 2n bits,

wherein the conditional probability vector values corresponding to the first bit to n^{th} bit of the first half are demodulated by one of the received signal components α and β, and the conditional probability vector values corresponding to the $(n+1)^{th}$ to $2n^{th}$ bits of the second half are demodulated by the remaining one of the received signal components α and β, and an equation applied for the two demodulations is the same in the first half and the second half, and

wherein [[the]] a first conditional probability vector is determined by selecting one of the received ~~values~~ signal components α [[with]] and β according to [[the]] a combination constellation diagram and applying [[a]] the following mathematical expression, [[22,]] where ~~in the mathematical expression 22,~~

① an output value is unconditionally determined as $\frac{a}{2^n}\Omega$ ~~[here,~~ , where Ω is a selected and received value which is one of α and β, and a is an arbitrary real number set according to a desired output ~~scope].~~ scope.

Claim 6 (currently amended). ~~The method according to claim 3,~~ A soft decision method for demodulating a received signal $\alpha + \beta i$ of a square Quadrature Amplitude Modulation (QAM) consisting of an in-phase signal component and a quadrature phase signal component, comprising:

obtaining a plurality of conditional probability vector values, each being a soft decision value corresponding to a bit position of a hard decision, using a function including a conditional determination operation from the quadrature phase component and the in-phase component of the received signal,

wherein a conditional probability vector decision method for demodulating a first half of a total number of bits is the same as a decision method for demodulating the remaining half of the bits, and is determined by substituting a quadrature phase component value and an in-phase component value with each other,

wherein the demodulate signal has 2n bits,

wherein the conditional probability vector values corresponding to the first bit to n^{th} bit of the first half are demodulated by one of the received signal components α and β, and the conditional probability vector values corresponding to the $(n+1)^{th}$ to $2n^{th}$ bits of the second half are demodulated by the remaining one of the signal components α and β, and an equation applied for the two demodulations is the same in the first half and the second half, and

wherein [[the]] a second conditional probability vector is determined by the received value selected when determining [[the]] a first conditional probability vector and [[a]] by employing the following mathematical expression [[23]],

where~~, in the mathematical expression 23, ① the~~ an output value is unconditionally determined as $a(c-\frac{c}{2^{n-1}}|\Omega|)$ ~~[here,~~ , where Ω is a selected and received value, n is a magnitude of the QAM, that is, a parameter used to determine 2^{2n}, a is an arbitrary real number set according to a desired output scope, and c is an arbitrary ~~constant].~~ constant.

Claim 7 (currently amended). ~~The method according to claim 3,~~ A soft decision method for demodulating a received signal $\alpha + \beta i$ of a square Quadrature Amplitude Modulation (QAM) consisting of an in-phase signal component and a quadrature phase signal component, comprising:

obtaining a plurality of conditional probability vector values, each being a soft decision value corresponding to a bit position of a hard decision, using a function including a conditional determination operation from the quadrature phase component and the in-phase component of the received signal,

wherein a conditional probability vector decision method for demodulating a first half of a total number of bits is the same as a decision method for demodulating the remaining half of the bits, and is determined by substituting a quadrature phase component value and an in-phase component value with each other,

wherein the demodulate signal has 2n bits,

wherein the conditional probability vector values corresponding to the first bit to n^{th} bit of the first half are demodulated by one of the received signal components α and β, and the conditional probability vector values corresponding to the $(n+1)^{th}$ to $2n^{th}$ bits of the second half are demodulated by the remaining one of the signal components α and β, and an equation applied for the two demodulations is the same in the first half and the second half, and

wherein [[the]] third to n^{th} conditional probability vectors are determined by a received value set when determining [[the]] a first conditional probability vector and [[a]] employing the following mathematical [[24]] expression (A),

where in the mathematical expression [[24]] (A),

first, dividing an output diagram in a shape of a basic V form, [[the]] wherein conditional probability vector corresponding to each bit is divided into $(2^{k-3}+1)$ areas,

[[the]] determining a basic expression according to ~~the basic form is determined as~~

$$a\left(\frac{d}{2^{n-k+1}}|\Omega|-d\right)$$

~~③ the~~ determining an output ~~is determined by~~ finding an involved area using [[the]] a given Ω and substituting a value of (|Ω|-m) such that a middle value is subtracted from each area into the basic expression as a new Ω, and

[[④]] rendering the middle value as $m=2^n$ and substituting the value of (|Ω|-m) into the basic expression as a new Ω in an area that is in the most outer left and right sides among the divided areas, that is, $(2^{k-2}-1)2^{n-k+2}<|\Omega|$, ~~[here,~~ where Ω is a selected and received value, n is a magnitude of the QAM, that is, a parameter used to determine 2^{2n}, k is conditional probability vector number (k = 3, 4, ..., n), d is a constant that changes according to the value of k, and a is a constant determining [[the]] an output ~~scope].~~ scope.

Claim 8 (currently amended). The method according to claim [[3]] 7, wherein the $(n+1)^{th}$ to $2n^{th}$ conditional probability vectors are sequentially obtained using one of the received ~~value~~ values of α and β that is not selected when the first conditional probability vector is determined and the mathematical expressions described above, (~~however,~~ except that the number k of the conditional probability vector included in the mathematical expression [[24]] (A) sequentially substitutes 3 to n with n+1 to 2n).

Claim 9 (currently amended). The method according to claim 4, wherein a [[the]] first conditional probability vector is determined by selecting any one of the received ~~values~~ signal components α and β according to a form of [[the]] a combination constellation diagram and then according to [[a]] the following mathematical expression: ~~25, where in the mathematical expression 25,~~

~~(a) the~~ an output value is unconditionally determined as $-\frac{a}{2^n}\Omega$ ~~[here,~~ , where Ω is a selected and received value that is one of α and β, n is a magnitude of the QAM, that is, a parameter used to determine 2^{2n}, and a is an arbitrary real number set according to a desired output ~~scope].~~ scope.

Claim 10 (currently amended). The method according to claim [[4]] 9, wherein [[the]] a second conditional probability vector ~~performs a calculation~~ is determined by substituting the received value selected with the received value that is not selected in the method for obtaining the first conditional probability vector. ~~of the second form.~~

Claim 11 (currently amended). The method according to claim 4, wherein [[the]] a third conditional probability vector ~~selects~~ is determined by selecting one of the received values α and β according to a form of [[the]] a combination constellation diagram, ~~uses a~~ using the following mathematical expression [[26]] (B) in the case of $\alpha\beta\geq0$, and ~~determines by~~ substituting [[the]] a received value selected in the mathematical expression [[26]] (B) with [[the]] a received value that is not selected in the expression in the case of $\alpha\beta<0$, where in the mathematical expression ~~26, the~~ (B) an output value is determined as $a(c-\frac{c}{2^{n-1}}|\Omega|)$ ~~[here,~~ , where Ω is a selected and received value, n is a magnitude of the QAM , that is, a parameter used to determine 2^{2n}, a is an arbitrary real number set according to a desired output scope, and c is an arbitrary ~~constant].~~ constant.

Claim 12 (currently amended). The method according to claim [[4]] 11, wherein [[the]] a fourth conditional probability vector is calculated by substituting each of the received values used with each of the received values that are not used in the method for obtaining the

third conditional probability vector ~~of the second form~~ in the cases of $\alpha\beta\geq 0$ and $\alpha\beta<0$.

Claim 13 (currently amended). The method according to claim 4, wherein [[the]] a fifth conditional probability vector ~~selects~~ is determined by selecting one of the received values α and β according to the form of the combination constellation diagram, ~~uses a~~ using the following mathematical expression [[27]] (C) in the case of $\alpha\beta\geq 0$, and determines by substituting the received value selected in the mathematical expression [[27]] (C) with the received value that is not selected in the expression in the case of $\alpha\beta<0$, where in the mathematical expression [[27]] (C),

① first, dividing an output diagram in a shape of a basic V form, and the conditional probability vector corresponding to each bit is divided into 2 areas,

② [[the]] a basic expression according to [[the]] a basic form is determined as

$$a\left(\frac{d}{2^{n-2}}|\Omega|-d\right),$$

③ [[the]] an output is determined by finding an involved area using [[the]] a given Ω and substituting a value of ($|\Omega|$-m) that a middle value is subtracted from each area into the basic expression as a new Ω,

④ rendering the middle value as $m=2^n$ and substituting the value of $|\Omega|$-m into the basic expression as a new Ω in an area that is in the most outer left and right sides among the divided areas, that is, $7\cdot 2^{n-3}<|\Omega|$, ~~[here,~~ where $\Omega$is a selected and received value, n is a magnitude of the QAM, that is, a parameter used to determine 2^{2n}, d is a constant, and a is a constant determining the output ~~scope].~~ scope.

Claim 14 (currently amended). The method according to claim [[4]] 13, wherein when the magnitude of QAM is 64-QAM, [[the]] a sixth conditional probability vector is calculated by substituting each of received values used with each of the received values that are not used in the method for obtaining the fifth conditional probability vector ~~of the second form~~ in the cases of $\alpha\beta\geq 0$ and $\alpha\beta<0$.

Claim 15 (currently amended). The method according to claim 4, wherein when the magnitude of QAM is more than 256-QAM, [[the]] fifth to $(n+2)^{th}$ conditional probability

~~vector select~~ vectors are determined by selecting one of the received values α and β according to the form of the combination constellation diagram, ~~is determined by a~~ using the following mathematical expression [[28]] (D) in the case of $\alpha\beta \geq 0$, and ~~determines by~~ substituting the received value selected in the mathematical expression [[28]] (D) with the received value that is not selected ~~in the expression~~ in the case of $\alpha\beta < 0$, where in the mathematical expression [[28]] (D),

① first, dividing an output diagram in a shape of a basic V form, and the conditional probability vector corresponding to each bit is divided into $(2^{k-5}+1)$ areas,

② [[the]] a basic expression according to the basic form is determined as

$$a\left(\frac{d}{2^{n-k+3}}|\Omega|-d\right),$$

③ [[the]] an output is determined by finding an involved area using [[the]] a given Ω and substituting a value of $|\Omega|$-m that a middle value m (for example, in the case of k=6, since repeated area is 1, this area is $2^{n-2} \leq |\Omega| < 3\cdot 2^{n-2}$ and the middle value is $m=2^{n-1}$) is subtracted from each area into the basic expression as a new Ω,

④ rendering the middle value as $m=2^n$ and substituting the value of $|\Omega|$-m into the basic expression as a new Ω in an area that is in the most outer left and right sides among the divided areas, that is, $(2^{k-2}-1)2^{n-k+2} < |\Omega|$, ~~[here,~~ where k is the conditional probability vector number (5, 6,...n), Ω is a selected and received value, n is a magnitude of the QAM, that is, a parameter used to determine 2^{2n}, a is a constant determining the output scope, and d is a constant that changes according to a value of [[k].]] k.

Claim 16 (currently amended). The method according to claim [[4]] 15, wherein when the magnitude of QAM is more than 256-QAM, the $(n+3)^{th}$ to $(2n)^{th}$ conditional probability vectors [[is]] are selected by the mathematical expression 28 using the received value that is not selected when determining the fifth to $(n+2)^{th}$ conditional probability vector ~~of the second form~~ in the case of $\alpha\beta \geq 0$,

and is obtained by substituting the received value selected in the mathematical expression [[28]] (D) with the received value that is not selected in the expression in the case of $\alpha\beta < 0$.

Claim 17 (currently amended). The method according to claim [[3]] 4, wherein [[the]] a first conditional probability ~~Vector of the first form~~ vector is determined by selecting any one of the received values α and β according to a form of the combination constellation diagram and then according to [[a]] the following mathematical expression [[29]] (E), where in the mathematical expression [[29]] (E),

① if $|\Omega|\geq 2^n-1$, [[the]] an output is determined as a*sign(Ω),

also, ② $|\Omega|\leq 1$, the output is determined as a*0.9375*sign(Ω),

also, ③ $1<|\Omega|\leq 2^n-1$, the output is determined as $a*sign(\Omega)[\frac{0.0625}{2^n-2}(|\Omega|-1)+0.9375]$,

~~[here,~~ where Ω is ~~anyone~~ any one of the received values α and β, 'sign(Ω)'indicates the sign of the selected and received value, 'a' is an arbitrary real number set according to a desired output scope, α is a received value of I (real number) channel, and β is a received value of ~~Q(imaginary number) channel].~~ Q (imaginary number) channel.

Claim 18 (currently amended). The method according to claim [[3]] 4, wherein [[the]] a second conditional probability vector ~~of the first form~~ is determined by [[the]] a received value selected when determining [[the]] a first conditional probability vector and the following mathematical expression [[30]] (F), where in the mathematical expression [[30]] (F)

① if $2^n-2^{n(2-m)}\leq|\Omega|\leq 2^n-2^{n(2-m)}+1$, [[the]] an output is determined as $a*(-1)^{m+1}$,

② if $2^{n-1}-1\leq|\Omega|\leq 2^{n-1}+1$, the output is determined as $a*0.9375(2^{n-1}-|\Omega|)$,

③ if $2^{n-1}-2^{(n-1)(2-m)}+m\leq|\Omega|\leq 2^n-2^{(n-1)(2-m)}+m-2$,

the output is determined as $-a*[\frac{0.0625}{2^n-2}(|\Omega|-2m+1)+0.9735(-1)^{m+1}+0.0625]$,

~~[here,~~ where Ω is a selected and received value, n is the magnitude of QAM, that is, a parameter used to determine 2^{2n}, 'a' is an arbitrary real number set according to a desired output scope, and ~~m=1,2].~~ m=1,2.

Claim 19 (currently amended). The method according to claim [[3]] 18, wherein [[the]] third to $(n-1)^{th}$ conditional probability vectors of the first form are determined by the received value selected when determining the first conditional probability vector and the

mathematical expression [[31]] (G), where in the mathematical expression [[30]] (G),

① if $m*2^{n-k+2}-1 <|\Omega|\leq m*2^{n-k+2}+1$, the output is determined as $a*(-1)^{m+1}$,

also, ② if $(2\ell-1)*2^{n-k+1}-1<|\Omega|\leq(2\ell-1)*2^{n-k+1}+1$,

the output is determined as $a*(-1)^{\ell+1}0.9375\{(|\Omega|-(2\ell-1)*2^{n-k+1})$,

also, ③ if $(P-1)*2^{n-k+1}+1 <|\Omega|\leq P*2^{(n-k+1}-1$,

when P is an odd number, the output is determined as

$$a*[\frac{0.0625}{2^{n-k+1}-2}[(-1)^{(p+1)/2+1}*|\Omega|+(-1)^{(p+1)/2}[(P-1)*2^{n-k+1}+1]+(-1)^{(p+1)/2}]]$$,

when P is an even number, the output is determined as

$$a*[\frac{0.0625}{2^{n-K+1}-2}[(-1)^{p/2+1}*|\Omega|+(-1)^{p/2}(P*2^{n-k+1}-1)]+(-1)^{p/2+1}]$$,

~~[here, Ω is a selected and received value, m= 0, 1, ..2^k-2,~~ where m in mathematical expression (G) is 0, 1, ...2^{k-2}, and ℓ is 1, 2,...3^{k-2}, k is conditional probability vector number ~~(k=3, ...n-1)].~~ (k=3, ...n-1).

Claim 20 (currently amended). The method according to claim [[3]] 19, wherein the n^{th} conditional probability ~~Vector of the first form~~ vector is determined by the received value selected when determining the first conditional probability vector and the following mathematical expression [[32]] (H), where in the mathematical expression [[32]] (H),

① if $m*2^2-1 \leq |\Omega| \leq m*2^{n2}+1$, the output is determined as $a*(-1)^{m+1}$,

also, ② if $(2\ell-1)*2^1-1<|\Omega|\leq(2\ell-1)*2^1+1$,

the output is determined as $a*(-1)^{\ell+1}0.9375\{(|\Omega|-(2\ell-1)*2^1)$,

~~[here, Ω is a selected and received value, m = 0, 1,...2^n-2;~~ where m in mathematical expression (H) is 0, 1,...2^{n-2} and ~~ℓ = 1, 2,...3^n-2].~~ ℓ is 1, 2,...3^{n-2}.

Claim 21 (currently amended). The method according to claim [[3]] 20, wherein the $(n+1)^{th}$ to $2n^{th}$ conditional probability vectors ~~of the first form~~ are sequentially obtained using the received value that is not selected when determining the first conditional probability vector and the mathematical expressions ~~30 to 32~~ (F) to (H), respectively, ~~[however,~~ except that the conditional probability vector number k included in the mathematical expression [[31]] (G) is sequentially used as 3 to n-1 instead of n+3 to ~~2n-1].~~ 2n-1.

Claim 22 (currently amended). The method according to claim 4, wherein [[the]] a first conditional probability ~~Vector of the second form~~ vector is determined by selecting any one of the received values α and β according to a form of the combination constellation diagram and then according to [[a]] the mathematical expression [[33]] (I), where in the mathematical expression [[33]] (I),

① if $|\Omega|\geq 2^n-1$, the output is determined as $-a*sign(\Omega)$,

also, ② $|\Omega|\leq 1$, the output is determined as $a*0.9375*sign(\Omega)$;

also, ③ $1<|\Omega|\leq 2^n-1$, the output is determined as

$$-a*[sign(\Omega)\frac{0.0625}{2^n-2}(|\Omega|-1)+0/9275]$$

,

~~[here, Ω is the selected and received value,~~ where 'sign(Ω)'indicates the sign of the selected and received value. ~~value, a is an arbitrary real number set according to a desired output scope, α is a received value of I (real number) channel, and β is a received value of Q(imaginary number) channel].~~

Claim 23 (currently amended). The method according to claim 4, wherein [[the]] a second conditional probability vector ~~of the second form~~ is calculated by substituting [[the]] a received value selected in [[the]] a method for obtaining [[the]] a first conditional probability vector ~~of the second form~~ with [[the]] a received value that is not selected in the method.

Claim 24 (currently amended). The method according to claim 4, wherein [[the]] a third conditional probability vector ~~of the second form selects anyone~~ is determined by selecting any one of the received values α and β according to [[the]] a combination constellation diagram, ~~and determines~~ using the following mathematical expression [[34]] (J) in the case of $\alpha*\beta\geq 0$, and substituting the selected and received value in the mathematical expression [[34]] (J) with the received value that is not selected in the mathematical expression [[34]] (J) in the case of $\alpha*\beta<0$, where in the mathematical expression [[34]] (J),

① if $2^n-2^{n(2-m)}\leq|\Omega|\leq 2^n-2^{n(2-m)}+1$, the output is determined as $a*(-1)^m$,

also, ② if $2^{n-1}-1\leq|\Omega|\leq 2^{n-1}+1$, the output is determined as $a*0.9375(|\Omega|-2^{n-1})$,

also, ③ if $2^{n-1}-2^{(n-1)(2-m)}+m\leq|\Omega|\leq 2^n-2^{(n-1)(2-m)}+m-2$,

the output is determined as $a*[\frac{0.0625}{2^n-2}(|\Omega|-2m+1)+0.9735(-1)^m-0.0625]$,

~~[here,~~ <u>where</u> Ω is a selected and received value, 'a' is an arbitrary real number set according to a desired output scope, α is a received value of I (real number) channel, β is a received value of ~~Q(imaginary number), and m=1,2].~~ <u>Q (imaginary number), and m=1,2.</u>

Claim 25 (currently amended). The method according to claim 4, wherein when the magnitude of QAM ~~of the second form~~ is less than 64-QAM, [[the]] <u>a</u> fourth conditional probability vector is calculated by substituting each of received values used with each of the received values that are not used in the method for obtaining [[the]] <u>a</u> third conditional probability vector ~~of the second form~~ in the cases of $\alpha*\beta\geq0$ and $\alpha*\beta<0$.

Claim 26 (currently amended). The method according to claim 4, wherein when the magnitude of QAM ~~of the second form~~ is 64-QAM, [[the]] <u>a</u> fifth conditional probability vector ~~select~~ <u>is determined by selecting</u> one of the received values α and β according to the form of [[the]] <u>a</u> combination constellation diagram, and ~~determines~~ using the following mathematical expression [[35]] <u>(K)</u> in the case of $\alpha*\beta\geq0$, and substituting the received value selected in the mathematical expression [[35]] <u>(K)</u> with the received value that is not selected in the expression in the case of $\alpha*\beta<0$, where in the mathematical expression [[35]] <u>(K)</u>,

① if $m*2^{n-1}-1\leq|\Omega|\leq m*2^{n-1}+1$, the output is determined as $a*(-1)^{m+1}$,

also, ② if $(2\ell-1)*2^{n-1}-1<|\Omega|\leq(2\ell-1)*2^{n-1}+1$,

the output is determined as $a*(-1)^{\ell+1}\{0.9375|\beta|-0.9375(2\ell-1)*2^{n-1}\}$,

~~[here,~~ <u>where</u> Ω is a selected and received value, 'a' is an arbitrary real number set according to a desired output scope, α is a received value of I (real number) channel, β is a received value of ~~Q(imaginary number) channel, m=0, 1,2, and ℓ=1, 2].~~ <u>Q (imaginary number) channel, m=0, 1,2, and ℓ=1, 2.</u>

Claim 27 (currently amended). The method according to claim 4, wherein when the magnitude of QAM ~~of the second form~~ is 64-QAM, [[the]] <u>a</u> sixth conditional probability vector is calculated by substituting each of received values used with each of the received values that are not used in [[the]] <u>a</u> method for obtaining [[the]] <u>a</u> fifth conditional probability

vector of the second form in the cases of $\alpha*\beta\geq 0$ and $\alpha*\beta<0$.

Claim 28 (currently amended). The method according to claim 4, wherein when the magnitude of QAM ~~of the second form~~ is more than 256-QAM, [[the]] fourth to n^{th} conditional probability vectors [[select]] are determined by selecting one of the received values α and β according to the form of [[the]] a combination constellation diagram, [[is]] ~~determined by a~~ using the following mathematical expression [[36]] (L) in the case of $\alpha*\beta\geq 0$, and ~~determines by~~ substituting the received value selected in the mathematical expression [[36]] (L) with the received value that is not selected in the expression in the case of $\alpha*\beta<0$, ~~where in the mathematical expression 36,~~ where in the mathematical expression [[36]] (L),

ⓐ if $m*2^{n-k+3}-1<|\Omega|\leq m*2^{n-k+3}+1$, the output is determined as $a*(-1)^{m+1}$,

also, ⓑ if $(2\ell-1)*2^{n-k+2}-1<|\Omega|\leq(2\ell-1)*2^{n-k+2}+1$,

the output is determined as $a*(-1)^{\ell+1}\{0.9375(|\Omega|-0.9375(2\ell-1)*2^{n-k+2})$,

also, ⓒ if $(P-1)*2^{n-k+2}+1<|\Omega|\leq P*2^{n-k+2}-1$,

when P is an odd number, the output is determined as

$$a*[\frac{0.0625}{2^{n-K+2}-2}[(-1)^{(p+1)/2+1}*|\Omega|+(-1)^{(p+1)/2}[(P-1)*2^{n-k+2}+1]]+(-1)^{(p+1)/2}],$$

when P is an even number, the output is determined as

$$a*[\frac{0.0625}{2^{n-k+1}-2}[(-1)^{p/2+1}*|\Omega|+(-1)^{p/2}(P*2^{n-k+2}-1)]+(-1)^{p/2+1}],$$

~~[here,~~ where k is conditional probability vector numbers (4, 5,…, n), Ω is a selected and received value, 'a' is an arbitrary real number set according to a desired output scope, α is a received value of I (real number) channel, β is a received value of Q (imaginary number) channel, m= 0, 1, ..2^{k-3}, ℓ is 1, 2,…3^{k-3}, and ~~p=1, 2…, 2^{k-2}].~~ p=1, 2…, 2^{k-2}.

Claim 29 (currently amended). The method according to claim 4, wherein when the magnitude of QAM ~~of the second form~~ is more than 256-QAM, [[the]] $(n+1)^{th}$ conditional probability vectors ~~is a received value selected when determining the fourth to n^{th} conditional probability vector of the second form, is~~ are determined using the following mathematical expression [[37]] (M) in the case of $\alpha*\beta\geq 0$, and ~~is obtained by~~ substituting the received value selected in the mathematical expression [[37]] (M) with the received value that is not selected

in the expression in the case of $\alpha*\beta<0$, where in the mathematical expression [[37]] (M),

ⓐ if $m*2^2-1 \leq|\Omega|\leq m*2^2+1$, the output is determined as $a*(-1)^{m+1}$,

also, ⓑ if $(2\ell-1)*2^1-1<|\Omega|\leq(2\ell-1)*2^{l}+1$,

the output is determined as $a*(-1)^{\ell+1}\{0.9375\{(|\Omega|-0.9375(2\ell-1)*2^1)$,

~~[here,~~ where Ω is a selected and received value, 'a' is an arbitrary real number set according to a desired output scope, α is a received value of I (real number) channel, β is a received value of Q (imaginary number) channel, m= 0, 1, ..2^{k-2}, and ℓ is ~~1, 2,...3^{k-2}]~~. 1, 2,...3^{k-2}.

Claim 30 (currently amended). The method according to claim [[4]] 28, wherein when the magnitude of QAM ~~of the second form~~ is more than 256-QAM, [[the]] a method for obtaining [[the]] an $(n+2)^{th}$ conditional probability vector is the same as the method for obtaining the fourth conditional probability vector in the case that the magnitude of QAM of the second form is less than 256-QAM.

Claim 31 (currently amended). The method according to claim [[4]] 28, wherein when the magnitude of QAM ~~of the second form~~ is more than 256-QAM, [[the]] $(n+3)^{th}$ to $(2n-1)^{th}$ conditional probability vectors are calculated by substituting each of received values used with each of the received values that are not used when determining the fourth to n^{th} conditional probability vectors in the cases of $\alpha*\beta\geq0$ and $\alpha*\beta<0$ when the magnitude of QAM of the second form is more than 256-QAM.

Claim 32 (currently amended). The method according to claim [[4]] 28, wherein when the magnitude of QAM ~~of the second form~~ is more than 256-QAM, [[the]] a $2n^{th}$ conditional probability vector is calculated by substituting each of the received values used with each of the received values that are not used when determining the fourth to the $(n+1)^{th}$ conditional probability ~~vector~~ vectors in the cases of $\alpha*\beta\geq0$ and $\alpha*\beta<0$ when the magnitude of QAM of the second form is more than 256-QAM.

Claims 33-38 (cancelled).